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on application.



HANDBOOK AND GUIDE
TO THE
BRITISH MAMMALS, etc.

ON EXHIBITION IN
THE LORD DERBY NATURAL HISTORY
MUSEUM, LIVERPOOL

THE PUBLIC MUSEUMS, LIVERPOOL

Illustrated by Eight Plates

(SECOND EDITION)

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Corporation of Liverpool.

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PREFACE.

Although the mammals, amphibians and reptiles of the British Isles are numerically insignificant compared with the birds, they are nevertheless of very great interest and well repay the necessarily greater trouble in seeking them in their native haunts. The groups on exhibition in our Museums have been designed to show individuals and families in their appropriate setting, thus continuing the practice of constructing habitat groups, commenced in 1865 with the birds. The artistry, accuracy and realism of the exhibits reflect great credit on the two Keepers of the Department of Vertebrate Zoology, Mr. J. W. Cutmore, and more recently, Mr. R. K. Perry.

The "Handbook and Guide to the British Mammals" was prepared as a companion volume to that dealing with the British Birds, and gives the visitor fuller information than is possible on the case labels. For those who wish to follow up the subject, there is a wide selection of interesting publications from which to choose. The earlier edition, which was largely the work of Mr. J. W. Cutmore, has been exhausted for some years, but the public appreciation of these guide books has determined us to pursue an energetic policy of revising the old volumes and issuing new ones whenever possible. The present guide book has been practically entirely rewritten and expanded by Mr. R. K. Perry, who has also superintended the making of the new series of illustrations.

DOUGLAS A. ALLAN,
Director of Museums.

CITY OF LIVERPOOL PUBLIC MUSEUMS.

March, 1932.

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INTRODUCTION.

The name "Mammal" is derived from the most salient characteristic of the group, the presence of milk glands in the female by means of which the young are nourished. Just as feathers constitute an indubitable mark of a bird, so true hairs are equally characteristic of mammals, although the hair may be reduced to a few bristles in the mouth, as in the whales. The limbs are usually four in number, the hind pair being sometimes modified into paddles, as in the seals, while the front legs are in some cases developed into wings, as in the bats. All mammals are lung breathers, and do not possess functional gills at any period of their life.

The terrestrial mammals known to have inhabited the British Isles during the historic period number about forty-eight. In addition, about twenty-six species of aquatic mammals have been recorded as occasional visitors to our coasts. The British mammals are divided into six orders; these orders, with a brief description of their outstanding features, are given below.

CHIROPTERA.

Bats are at once distinguished from all other mammals by their power of flight. The structure of a bat's wing is very simple, consisting of a framework formed by the bones of the arm and enormously elongated fingers, between which the flying membrane is expanded. The hind legs are small and unable to support the weight of the body, thus making bats very helpless on the ground. Their progression, when crawling, is a series of sidelong plunges giving the animal a most awkward shuffling gait. It is, however, very much quicker in climbing a tree. When sleeping, bats hang perpendicularly from some projection by the claws of their hind feet, generally using one foot at a time, the knee remaining crooked. The tail membrane and the wings are folded over the stomach.

Our British bats depend but little for guidance on their sense of vision, the eyes being very small, and often partially concealed under the large ears and fur. They are, however, extremely sensitive in their hearing, and the considerable ear surface together with the extraordinary development of cartilage round the nose, richly supplied with nerves, enable them to avoid obstacles during flight.

INSECTIVORA.

This is a group of animals which, as their name implies, feed chiefly on insects. They are small, of a dull and inconspicuous coloration, and are nocturnal in habits, gaining their living either by burrowing in the ground for worms and



p.15.

THE MOLE.

CASE 4.

grubs, or by hunting for beetles or other insects in the grass. Insectivores are plantigrade, that is, they place the whole palm and the whole sole on the ground when they walk. The snout is usually elongated to form a short proboscis. The first incisor is usually larger than the other, and there are no flesh-teeth. The cheek-teeth carry small sharp cusps, which are used in breaking up the hard coverings of the insects upon which these animals chiefly feed, and the canine teeth are small. The hedgehog, mole and shrew are typical of this group.

CARNIVORA.

This order has received its name from the characteristic flesh-eating habits of its members. They have small insignificant front teeth or incisors, but the eye-teeth or canines are large and pointed. With these, the animal seizes and kills its prey. The cheek-teeth usually have sharp crowns, compressed from side to side, one cheek-tooth on each side of the jaw being usually markedly larger than the others and biting with a scissor-like action against its fellow in the opposite jaw. This is used in cutting up the flesh of prey, hence its name "flesh-tooth." The lower jaw is articulated to the skull by a closely-fitting transverse hinge, which gives great strength and firmness to the joint, but deprives the animal of the power of moving the jaw backwards and forwards, or from side to side, its only motion being in a vertical direction. This is an adaptation which is necessary to the carnivores, which must obtain a firm grip on their struggling prey. There are two types of British carnivores, a terrestrial type, such as the wild cat, fox, otter, badger, stoat, weasel, polecat, and pine martin, and an aquatic type, with limbs modified into swimming organs, such as seals.

RODENTIA.

These are gnawing animals, which are at once distinguished by the peculiar dentition. In front of the mouth there are four large, curved, chisel-like incisor teeth, two of them being in the upper and two in the lower jaw. They are of great service in gnawing away the shells of nuts to reach the kernel, or in cutting the bark of trees. The enamel, which is often of an orange colour, is usually confined to the front surface of the incisors. The hard enamel does not wear so quickly as the dentine, which lies behind it, and consequently the incisors always have a chisel-like edge. These teeth, moreover, continue to grow from their roots as fast as they wear down at their tips during the whole life of the animal. Rodents do not possess canine teeth, and their cheek-teeth are few in number, so that there is a marked gap between the incisors and the cheek-teeth. Another structure peculiar to rodents is found in the mouth, an ingrowth of the skin of each side of the face dividing the mouth into two unequal

chambers, a large hinder chamber which contains the cheek-teeth, and a front chamber which contains the incisors, the two chambers communicating by means of a narrow passage. This adaptation serves to prevent the entrance of chips of wood and other materials into the throat, when the animal is engaged in gnawing. Captive rodents persistently gnaw the woodwork of their cages, and this instinctive grinding keeps the incisors sharp and prevents them growing long. Typical British rodents are hares, rabbits, squirrels, rats and mice.

UNGULATA.

In this group of mammals, the limbs are mainly organs for running and their motion is practically restricted to a backward and forward one. The males possess antlers which are shed and renewed annually without any horny sheath enveloping them, but during growth they are covered with a sensitive hairy skin provided with blood vessels, the so-called "velvet." When the antlers have reached their full growth, the blood vessels become constricted at the "burr," close to the skull, the "velvet" dries up, and is rubbed off. The antlers, then bare and non-sensitive, are ready for their sole function—fighting. In most animals the toes are provided with claws, but in this group the toes are enclosed within blunt nails or hoofs. The molar teeth of ungulates have broad crowns with ridged surfaces, and are well adapted for grinding and masticating the vegetable substances upon which they feed. The red deer, fallow, and roe deer are examples of this order.

CETACEA

Although so different in appearance to other mammals, this order possesses all the essential characteristics by which mammals are distinguished. They possess warm blood, breathe air by means of lungs, bring forth their young alive, and nourish them for a time with milk, all these characters agreeing with the other members of their classes. The striking external differences are all due to adaptation to an entirely aquatic life. Their form is fish-like, the fore-limbs are modified into flattened paddles, and there are no signs of hind limbs externally, although they are represented by a few small bones hidden within the body. The tail forms horizontal "flukes," by means of which the animal is propelled through the water. Hairs are almost entirely absent, a few bristles in the region of the lips alone being present. A thick layer of fat, known as "blubber," functionally replaces the hair, and serves to keep the body warm. The nostrils, generally called "blow holes," open separately by single valve-like apertures near the top of the head. Whales, dolphins, and porpoises are examples of this order.

BRITISH MAMMALS

The collection of British Vertebrates will be found on the north side of the Lower Horseshoe Gallery adjoining the British Bird Groups. As far as possible, typical species of each order are mounted in their natural surroundings. All the groups have been prepared in the Museum, the earth, stones and vegetation, in many cases, being obtained from the actual haunts of the various animals.

The nomenclature is that employed in the "British Museum Catalogue of the Mammals of Western Europe," Gerritt S. Miller (1912), and "Report on Cetacea," S. F. Harmer (1927).

CASE 1

GREATER HORSESHOE BAT (*Rhinolophus ferrum equinum*)

This species takes its names from the leaf-like plates of skin surrounding the nostrils, the most conspicuous being shaped like a horseshoe. This bat is common only in the southern counties of England, being rare in the Midlands, and unknown in the northern counties and Scotland. In flight, this bat may be identified from other species by the greater width of the flying membrane. It appears rather late in the evenings, and frequents the neighbourhood of trees, flying round and round the foliage to snap up flying beetles and other insects, especially cockchafers. During the day, and when hibernating, the favourite haunts of this species are ancient buildings and caves, and in such places large numbers often congregate.

LESSER HORSESHOE BAT (*Rhinolophus hipposiderus*) CASE 1

This bat, as the name suggests, is smaller than the former species. It is confined in England chiefly to the southern counties, and it also occurs in Ireland, where it has been found in caves in Galway and Clare. It is small in size, the length of the body not exceeding 1½ inches. The well-developed nose-leaf completely surrounding the nostrils, and the large ears, which have no trace of inner ear, or tragus, characterise this and the previous species.

PIPISTRELLE BAT (*Pipistrellus pipistrellus*)**CASE 1**

The smallest of our British bats is the Pipistrelle. It is also one of the most widely distributed, being found throughout the British Isles, inclusive of the Hebrides. Its favourite food consists of gnats, but moths and other flying insects are also eaten. The Pipistrelle appears earlier and retires later than the other British bats, often making its appearance as early as March, and not finally hibernating until the very cold weather has set in. Its flight is swift, accompanied by sudden turns and descents, and may often be observed during the summer evenings in the streets of cities. As hiding-places during the day and hibernation, this species resorts to crevices in walls, eaves of houses and hollow trees. So far as is known, this species only has one young at a time, females being generally taken with young in the month of July.

WHISKERED BAT (*Myotis mystacinus*)**CASE 1**

This species takes its name from the long hairs on the face, which cover the upper lip. It is much less common than the Pipistrelle, occurring more frequently in the southern and midland counties of England and extending as far north as the Lake District. In Ireland it has been taken in County Clare, but in Scotland it is unknown. In its mode of flight and general habits it is similar to the Pipistrelle, though it does not seem so averse to daylight as other species of bats. Roofs of buildings, hollow trees, and caverns are its favourite resorts during daylight, and hibernation. The young are produced during the end of June or the beginning of July.

NATTERER'S BAT (*Myotis nattereri*)**CASE 1**

The reddish grey or Natterer's bat is of somewhat local distribution, being found in the south and Midlands of England, the west of Scotland, and in Dublin, Cork, Wicklow and Longford. In habits it is a sociable species, being found in large numbers in places of repose, such as old buildings, and especially church towers.

DAUBENTON'S BAT (*Myotis daubentonii*)**CASE 1**

This species closely resembles the last, but generally the under parts are of a smoky hue, and it lacks the hairs along the membrane between the legs. It is widely distributed in Britain, extending in Scotland as far north as Aberdeen. In Ireland it is rare, but it has occurred in Kildare, Donegal and Kerry. Daubenton's bat has a particular affection for the vicinity of water, over which it skims like a swallow. When flying thus, it dips its nose frequently into the water, either to drink or in pursuit of prey. Flight begins soon after sunset, the day being passed in hollow trees or caves.

NOCTULE BAT (*Nyctalus noctula*)**CASE 1**

The Noctule is the largest of the British bats, measuring about five inches in length. From the southern and Midland counties of England, the habitat of this bat extends to Norfolk and Suffolk, where it is common in certain localities. This species flies high and rapidly, and when in pursuit of insects utters shrill squeaks. Though a most cleanly animal in keeping its fur in proper condition, it emits a very offensive odour, and when numbers of these bats congregate either in a hollow tree or under the eaves of a house, the atmosphere is very objectionable. This species is fairly common in this locality.

LEISLER'S BAT (*Nyctalus leisleri*)**CASE 1**

This species closely resembles the Noctule, but is a little smaller. The distribution of this bat is not very clearly known as regards the British Isles. It has been recorded from the western Midlands of England, the Lake District, Cheshire, and the north-east of Ireland. Its flight is said to be of higher elevation than that of the Noctule bat, and it flies in a zig-zag fashion, as if uncertain as to direction. In other habits it resembles the Noctule bat.

LONG-EARED BAT (*Plecotus auritus*)**CASE 1**

This bat is readily distinguished by the enormous size of the ears, which are proportionately longer than in any other animal. It is widely distributed throughout the British Isles, though it may be absent from the Hebrides and Shetland Islands. This bat is more confirmedly nocturnal than other species. It may be seen hawking insects in the early twilight, and apparently remains abroad throughout the night. The Long-Eared bat is a cleanly creature, assiduously removing impurities from its fur at all times. They are affectionate towards each other, and very playful. This bat apparently brings forth its young in the month of June, a single one at a birth. The favourite resorts of these bats are church towers, and the roofs of open buildings or outhouses. In such places during the summer months they may be found hanging in large clusters. In winter, when hibernating, they frequently pack themselves in holes or crevices of timber.

THE COMMON SHREW (*Sorex araneus*)**CASE 2**

The Shrews are not even remotely related to the mice, although often confused with them. Shrews differ from mice by having long-pointed noses, very small eyes and ears, and

in other anatomical characters as well. The Common Shrew is found throughout Great Britain, but is absent from Ireland. Its food consists of worms and insects of various kinds, slugs, snails and even young frogs. Owing to the enormous amount of grubs and slugs which this animal devours, it is a great benefactor to agriculture and should be strictly protected. Shrews are extremely quarrelsome, and their squeaking cries may be frequently heard in the hedgerows. During the autumn, shrews are often found dead on paths and in lanes, probably owing to the shortage of insect food at this season. The peculiar musk-like odour associated with shrews is emitted from a gland on each flank of the body, the position of which is marked by a double row of coarse hair. These glands secrete a fluid of an offensive pungent musky scent, which makes the shrew distasteful to some carnivorous birds and animals. During the spring, the female selects a sheltered spot in a hedgebank, and with grass and leaves constructs a dome-shaped nest. In this nest, five to seven blind and hairless young are brought forth.

THE PIGMY SHREW (*Sorex minutus*)

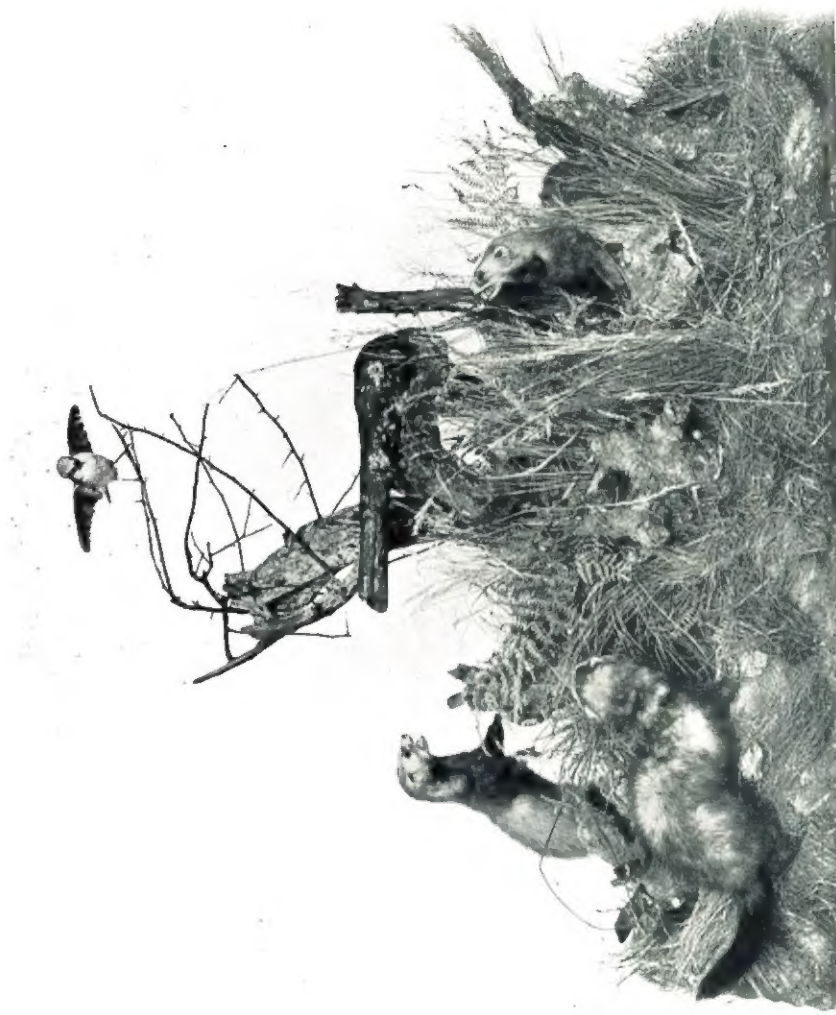
CASE 2

This little creature is the smallest British mammal, its head and body barely exceeding one inch and three-quarters in length. It has a wider distribution than the Common Shrew, being found in Ireland and the Hebrides, as well as the mainland of Great Britain. Its teeth are so small as to be almost invisible except with the aid of a lens. In habits it resembles the Common Shrew.

THE WATER SHREW (*Neomys fodiens bicolor*)

CASE 2

This species may be distinguished at once from the Common Shrew by its larger size, almost black back and silvery underside, and stiff hairs which fringe the tail and feet. The Water Shrew is fairly common in suitable localities in England and Wales, but it is unknown in Ireland and the Scottish islands. Its swimming and diving powers are remarkable, much of its food being procured by diving and turning over stones and leaves on the stream bottom. Fresh-water shrimps, snails, spawn, and occasionally fish fry are consumed, and the flesh of dead animals is also eaten. The Water Shrew excavates long winding burrows in the banks of small streams, ditches and ponds, the extremity of the burrow being expanded to form a rounded, grass-lined chamber, which is used as a dwelling-place and nest. Several litters are born between the months of May and November. Each litter may contain from five to ten young.



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THE POLECAT.

CASE 6.

THE HEDGEHOG (*Erinaceus europaeus*)**CASE 3**

[See PLATE II.]

This well-known and widely-distributed species is found throughout England, Ireland, and the southern parts of Scotland. Although often abundant, it is seldom seen on account of its nocturnal habits. Its food is varied, insects slugs and worms forming the principal part, but young birds, snakes, frogs and mice are also eaten. The characteristic feature of the Hedgehog is the dense coat of short spines covering the back and sides of the body. These spines, which are enlarged and stiffened hairs, form an excellent protection against attack. When threatened, the body can be rolled up, by the aid of a special set of powerful skin muscles, into a prickly ball, the head and limbs being completely hidden, and few creatures care to attack such a formidable array of spines, although it is said that badgers and foxes occasionally contrive to kill hedgehogs in spite of this defence. Early in summer a bulky roofed nest is constructed of dead leaves, grass and moss, a favourite site being a hollow in a dry hedge bank. In this nest the female produces from four to six young, with soft white flexible spines which rapidly harden in the course of a few days. The young, at first, are totally blind, and incapable of rolling themselves up. A second litter may be produced later in the year. Generally in December a winter retreat is constructed similar to that of the nest, and in this the Hedgehog, rolled up into a ball, becomes torpid and sleeps until the warm days of March. During this period of hibernation, it is not known to eat, and unlike most hibernating animals lays up no store of food. As a rule Hedgehogs are silent, but they utter loud shrill squeaks, on occasion, especially when trapped.

THE MOLE (*Talpa europaea*)**CASE 4**

[See PLATE II.]

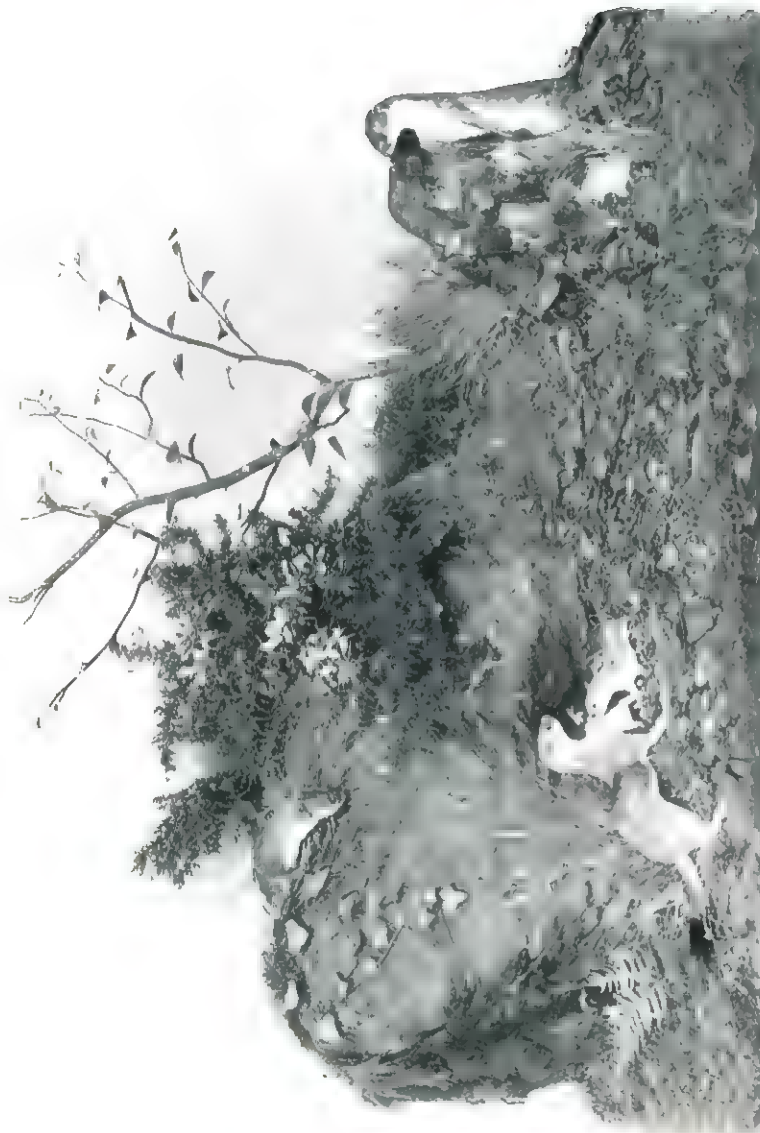
This small, burrowing animal is common throughout England and Wales, in Scotland it is chiefly confined to the Lowlands, and in Ireland it is unknown. The Mole is extremely voracious, and quickly dies of starvation if it cannot procure food every few hours. Worms form its principal diet, but insects and their larvae, frogs, lizards, and small birds are also eaten. Moles pass almost their entire existence digging underground, and for this mode of life their structure is wonderfully adapted. The body is cylindrical, a shape admirably suited for progression in earth tunnels. The velvet-like fur is short and set vertically in the skin, not directed backwards as in most animals. This permits with equal facility a backward or forward movement of the animal. The nose is long, pointed and mobile, and is strengthened by a nodule of bone. External ears are absent. The eyes are reduced to vestiges, although still retaining a certain amount

of sensitiveness to light, and appear merely as small black points embedded in the fur. The fore limbs are enormously powerful, by reason of the leverage due to the shortening of the skeleton whereby the foot alone projects beyond the body. The width of the fore foot is increased by a sickle-shaped bone along the margin. The feet, or hands, are turned outwards instead of downwards and are furnished with long strong claws, serving as excellent instruments for tunnelling in soft earth. In summer, this animal spends much of its time tunnelling just below the surface of the ground in search of food. By autumn, its wandering becomes more restricted, and it then retires to winter quarters, consisting of the so-called "fortress," with more or less complete systems of tunnels in connection. The large mounds of earth, noticeable where Moles are abundant, are the fortresses, while the smaller mounds are made by the earth thrown up during the construction of the runs. The fortress of the female is simpler in structure but of larger size, and is designed for breeding purposes. The group in this case shows a fortress with three nests. The young, from three to six in number, are born blind and hairless, but are able to follow their parents in five weeks, when they are about three-quarters grown.

THE MARTEN (*Martes martes*)

CASE 5

The Marten is the largest and most elegant of the weasel tribe, and may be distinguished from the polecat by its more pointed muzzle, larger ears, more bushy tail and yellow patch on the throat and chest. In former days this species was common throughout the wooded areas of the British Isles, but now it survives only in isolated parts of the country. The range of the marten includes many parts of England, such as Suffolk, North Devonshire, Epping Forest, and Hampshire. In the Lake District of Cumberland it is somewhat rare; in Scotland it is scarce; in the wilder parts of Wales, such as Caernarvon and Merioneth, where thickly wooded valleys and rugged mountain sides form a secluded retreat, it is often seen; it is also found in the west of Ireland. The food of the Marten consists of such birds as can be captured, together with small mammals, reptiles and eggs. It also consumes rowan-berries and other fruits, and when on the shore will eat shell-fish. During the breeding season Martens generally frequent woods, in order to adopt some bird's nest or squirrel drey as a home for their young. From two to seven young are produced in a litter, and there are two litters in a year. The fur skin of the Marten has always been a valuable article of trade, although of less value, however, than the foreign Marten, whose coat possesses a richer colour and thicker and longer fur. Many thousands of pelts of this animal are imported from the Continent every year.



p.17.

THE STOAT.

CASE 7.

THE POLECAT (*Mustela putorius*) [See PLATE III.]

CASE 6

This extremely bloodthirsty species was formerly common throughout the wooded areas of Great Britain, but owing to its persecution by gamekeepers it is now confined to the wilder regions, where thick woods afford inaccessible retreats. In Ireland it never seems to have been common, and it is now apparently extinct. It preys chiefly on rabbits and birds, but lizards, snakes and frogs are also eaten. Polecats are remarkably strong and agile for their size, and their nocturnal visits to farmyards are most unprofitable for the farmers, fowls, geese and turkeys falling victims to their raids, which do not cease until every inhabitant of the poultry run has been slain. This insatiable lust for blood is characteristic of the species. The coat is shed during the late spring, the female or "gill" accomplishing this change soon after the birth of her young, which is usually during the early part of May. In the male or "hob," the change takes place more slowly, lasting throughout May. The male is then known as the "black polecat," from the rich dark colour of its fur. During April or the beginning of May, the female brings forth from three to eight young, for whose accommodation a nest is constructed in some disused rabbit warren or among boulders overgrown with weeds. The name Foulmart is often given to the Polecat on account of the foetid odour emitted from its musk glands when the animal is alarmed. The domesticated form of the Polecat is known as the Ferret. It has been modified by captivity, and is usually smaller, more slender and generally of a yellowish-white colour, with pink eyes. Ferrets are used chiefly for hunting rabbits and rats.

THE STOAT (*Mustela erminea*) [See PLATE IV.]

CASE 7

No other animal of its size can equal the Stoat in ferocity and blood-thirstiness. It has a wider distribution in the British Isles than the weasel, occurring in Ireland as well as in Great Britain, although the Irish representative forms a distinct race. Of the Scottish islands, Lewis is said to be the only one in which Stoats are unknown. Rabbits are its favourite food, but it also preys on leverets, rats, and voles. The Stoat is an expert climber, and it will attack sitting birds, especially the song thrush and the blackbird, and plunder the nest. Stoats are constantly fighting among themselves, and this incessant warfare is fortunate since it keeps the numbers of this relentless little killer within reasonable bounds. They pair early in the year, and their young are born in April or May. There are usually five to eight in a litter, but occasionally they number as many as ten. The ten young ones and parents in the group were captured on the estate

of Lord Sefton, West Derby. The nursery, composed of dead leaves and grass, may be placed in a hollow tree, a hole in a bank, a hillock of a mole, or on a pile of faggots in the secluded part of a wood. Should the food run short, the young are conveyed by the parents to a more fruitful area. The female defends her young with great pertinacity and courage. She can inflict a severe bite, and is possessed of immense agility. When the young are old enough to venture forth with their parents, they frequently hunt together. In winter the Stoat turns white, only the tail tuft remaining black. This change, however, occurs regularly only in the northern parts of its range, in Scotland for example. In the north of England white Stoats are not common, while further south they are rare. There has been in the past much controversy as to how this colour change is brought about. It is stated by Metchnikoff that the transformation is a change in the fur itself. There is no moult. A rapid fall in temperature affects the pigment granules, which give the hairs the colour we see with the naked eye. These granules are destroyed by a kind of phagocyte, the result being the white Stoat—the ermine of commerce.

THE WEASEL (*Mustela nivalis*)
[See PLATE V.]

CASE 8

The Weasel is the smallest of our British carnivores, and is distinguished from the stoat by its smaller size and the absence of a black tuft on the tail. Although common throughout England, Wales and Scotland, it is unknown in Ireland. Possessing all the ferocity and agility of its cousin, the stoat, it pursues with relentless energy rats, mice and voles in their underground runs. It is a good swimmer, and will follow its quarry across streams of considerable width, and for the same purpose it will also climb trees. At all times the Weasel is a bold and inquisitive animal, exhibiting little fear of man, especially if its young are near. The effect of the Weasel's hunting can be regarded as beneficial on the whole, considering the large number of voles and other small destructive rodents it destroys. Female Weasels are much smaller than the males, and at one period were regarded as different species. The pairing season is from January to March, and during this period a nest or nursery is prepared in some tree stump or in crevices among loose boulders. In this nest the female produces five to six young, two or three litters being born in a season. In defence of her young, the female shows great courage, and if her offspring are molested will quickly remove them to fresh quarters. In about six weeks the young are able to look after themselves. In winter the fur of the Weasel is paler than in summer, and very rarely it may become quite white, which in northern Europe is the normal winter coat.

PLATE V.



p. 18.

THE WEASEL.

CASE 8.

THE OTTER (*Lutra lutra*)

CASE 9

[See PLATE VI.]

The structure of the Otter is wonderfully adapted for an almost entirely aquatic life. The body is long and sinuous, the head is flattened, the exterior ears are short and pressed tight to the head, and the eyes are prominent and situated not far behind the nostrils, thus enabling the animal to see upwards, and so pursue its prey. The legs are short and heavily muscled, the feet webbed, and the tail is horizontally flattened, to act as a powerful rudder to the animal when it is in pursuit of a fast swimming trout around boulders. The fur consists of two distinct coverings, a coat of strong coarse hair, called "guard hairs," and a thick, short, woolly undercoat of fur which insulates the body from cold. Although far from uncommon in many parts of Great Britain, such as the rocky parts of Somerset, Devon and Monmouthshire, as well as in the streams and lakes of Cumberland and Westmorland, the Otter is now rarely met with in districts like the fens of Norfolk, Suffolk, and Cambridgeshire, where it was once numerous. In England and the south of Scotland it is an inhabitant of fresh water, but farther north as well as on the west coast of Ireland and in some parts of Cornwall it prefers the sea-coast, taking up its quarters in caverns. During stormy weather, the sea is forsaken for the quieter rivers and lakes. The food consists almost entirely of fish, which it pursues, not only in rivers and lakes, but often in the open sea. For various reasons, Otters often use the same landing place for this purpose. These animals are said to be wasteful feeders when fish are plentiful, and land more fish than they can eat. The Otter usually kills its fish by biting through the backbone, and will leave fish lying about with only a small portion of the shoulder eaten. Otters are severely persecuted by owners of trout and salmon rivers, although they devour large numbers of that ova-destroying fish, the eel. The animal is nocturnal but, like the fox, can occasionally be seen in quiet places during the day. Early morning is its favourite time for fishing excursions. It is a tremendous wanderer with a wonderful sense of locality. Otters usually pair in mid-winter, and from two to five young are born during March or April, a well-concealed tunnel in a river bank or a hollow tree near the water serving as a den or "holt." Only one litter is produced in a year. The cubs are born blind, and usually remain with their parents until the autumn. Otter cubs do not take kindly to the water at first, but after they have learned to swim, will follow the female as she leads them to suitable hunting and playing quarters. When the skin of the Otter is used for wearing apparel, the long "guard" hairs are plucked, leaving only the soft fine undercoat.

THE FOX (*Vulpes vulpes*)

CASE 9

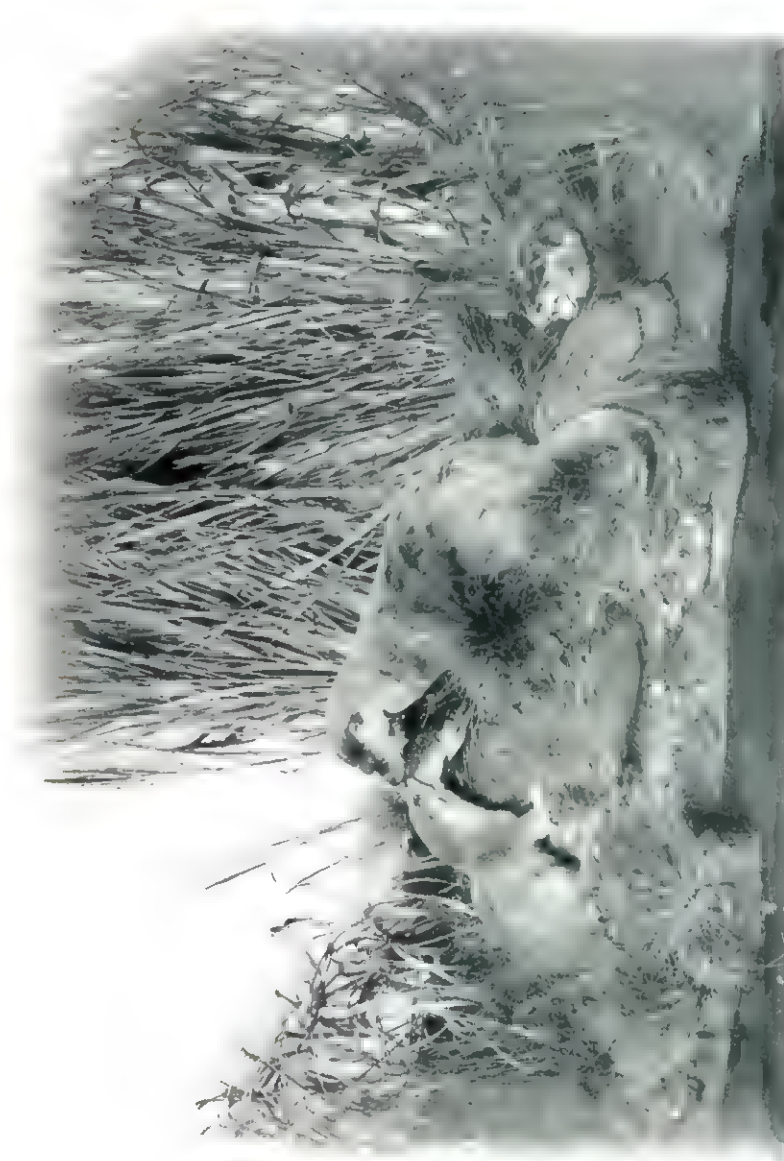
Widely distributed throughout the British Isles, this symbol of cunning, the Fox, is the only surviving wild member of the dog family. This species, like the wolf, would in all probability have become extinct long since, but for the protection afforded it for hunting purposes. Thousands of pounds are paid annually to farmers to compensate them for farmyard casualties committed by "Reynard." On the other hand, it performs considerable service to the farmer in keeping down the numbers of such prolific pests as rabbits, voles and mice, which are very destructive. The fox shows a considerable amount of variation, not only as regards colour, but also in the matter of size. Foxes from the Highlands of Scotland, for example, are larger and longer-legged than those from the Lowlands, and the same difference appears to be characteristic of examples from high and low elevations in England and Wales. The short-legged form is known as the "Terrier Fox," while the long-legged, long muzzled, hill animal is known as the "Grey-hound Fox." The food consists of small mammals, birds (domestic and wild), insects and worms, and when near the sea, a Fox will search the shore for crabs and shell-fish. Foxes are mostly nocturnal, and even when abroad in daylight are not easily observed, the russet coat blending so well with the brown patches of leaves and earth. The large, bushy tail, or brush, is most useful to encircle the curled body, when the animal sleeps in the open during the winter, but it is a great handicap when being hunted over fresh ploughed fields on a wet day, the clinging mud retarding the fugitive's speed. Foxes usually have their dens or "earths" in light soil, avoiding heavier ground because they are not endowed with the powerful digging claws of the badger. Favourite sites are thickets, woods and on slopes of hills. The cubs, four to seven in number, are usually born in March or April, though they have been known to occur as early as February. From the time of their birth to a short time after the opening of their eyes, the cubs are of a uniform sooty colour. When a little older, they differ from their parents in being uniformly tawny above and smoke below. They are extremely playful. The fox possesses a gland near the tail which contains a foetid secretion which, when emitted, gives off a pungent, offensive odour, the "scent" which the hounds are able to follow.

THE BADGER (*Meles meles*)

CASE 10

The Badger is one of the most interesting of our British mammals. It is classed with the weasels though, externally at least, it resembles the bears. It travels on the flat of the fore-feet (plantigrade) and is semi-plantigrade in the hind feet. Although by no means common, Badgers are still fairly

PLATE VI.



p. 19.

THE OTTER.

CASE 9.

numerous throughout the British Isles, where thick woods and solitude obtain. Their food consists of roots, fruits, nuts, truffles and other fungi, birds' eggs, small mammals, frogs, and insects. Wasp grubs are highly esteemed as food, and when located, are rapidly dug out with strong claws, in spite of the angry wasps, whose stings seem to have but little effect on the animal's tough skin. Except that it may occasionally destroy the eggs of game birds, this species is harmless alike to the game preserver and to the farmer, and the persecution, to which in this country it has always been subject at the hands of man, is due rather to the innate desire of killing and hunting, than on account of any damage inflicted. Nocturnal in habits, it is a tremendous digger, and in rock country will drive its galleries under and around boulders, making for itself a lair or "sett" from which it cannot be ejected, either by digging or with terriers. In softer soil, these setts often run underground for considerably over a hundred yards. In the deep recesses of the sett, a large nest is constructed of dry ferns and grass, in which three to four young are produced, usually between March and June. Formerly Badgers were in great demand for the peculiarly barbarous "sport" known as badger-baiting, the animal being placed in a tub and attacked by dogs, whose object was to draw it from its shelter. The dogs were generally seriously wounded before they attained their object, for the bite of the Badger is very severe. Badgers are still found in this local area, but are scarce. They are nocturnal, and of a kindly disposition, and are very cleanly in their habits.

THE WILD CAT (*Felis silvestris*)¹

CASE 11

Formerly common throughout Great Britain and Ireland, the Wild Cat is now met with only in the more inaccessible parts of the Scottish Highlands, where on many of the large estates it is now protected and will be enabled to survive for many years. Wild Cats are quite a different species from domestic cats, many so-called Wild Cats being domestic cats of a similar colour which have run wild, and should thus be called "feral cats." The true Wild Cat is of more powerful build, possesses stronger and longer limbs, a shorter and more bushy tail, and has longer hair than the domestic form. The general striping of this animal is of protective value, harmonising admirably with its natural surroundings, and being of great assistance when it is stalking its prey. Being purely carnivorous, it feeds principally on rabbits, but hares, grouse and other birds are also eaten, and at times it will even attack and kill prey as large as roebuck fawns. Fond of seclusion, it selects such sites as trees, thick bushes, clefts and crevices in rocks for its lair. Four to six kittens are produced during the early part of the summer, and are carefully guarded until able to look after themselves. The Wild Cat is fierce and untamable in captivity.

THE COMMON SEAL (*Phoca vitulina*)

CAS 2

The Common Seal is the typical representative of a group of marine mammals, characterised by the peculiar shape and structure of their limbs, which instead of being used for locomotion on land are transformed into flippers for swimming. In the sea seals are expert swimmers, but on land they are awkward and ungainly in their movements, the hind limbs being extended backwards parallel to the tail, and incapable of taking a part in forward movement. Progress on land is made by a series of jumping movements of the body. A hundred years ago this species was abundant in the water surrounding the British Isles, but it is now greatly reduced in numbers. On the eastern and southern coasts of England, seals are seldom seen, but along the shores of the northern and western counties and the rocky coast of Wales they are not uncommon. On the more rugged coasts of Scotland it is still quite common, but on the Irish coast, where it was formerly abundant, it is stated to be rare. Occasionally an individual seal wanders up the Mersey and the Dee. The food of the Common Seal consists in the main of fish, and occasionally crustaceans and molluscs. It will also pursue small salmon for a considerable distance up a river. In captivity, it exhibits a strong preference for herrings as food. Sociable in habits, and when unmolested, it is usually found in small herds comprising from two to three dozen individuals. Seals never leave the vicinity of water, although much of their time is spent ashore, where they lie with their heads all turned seaward, ready to take to the water at the slightest alarm. The pairing season is in September, and the single young is born in the month of June. Occasionally there may be two. The young take to the water a few hours after birth. When they are born, they are covered with a thick coat of soft white fur, which is shed a few hours later, and there is left a smooth coat with silky hair similar to that of the adult, although it is generally more spotted and streaked with dark markings. The Common Seal is not a silent animal—the young seal makes a constant baa-ing sound, especially when seeking nourishment from the mother, and adults vary their grunts with a plaintive bleat or a loud bark. Seals are peculiarly curious and fond of music. The pelt of the Common Seal is of little value, the coat consisting of rather coarse hair and lacking the fine undergrowth of fur which is possessed by the fur seal of the North Pacific.

THE GREENLAND SEAL (*Phoca groenlandica*)

CASE 12

This seal is readily distinguished from the rest of the species by its remarkable coloration. An inhabitant of the Arctic Ocean, it is only a casual visitor to the British Isles.

In January, 1868, a specimen, 6 ft. long, was captured in Morecambe Bay, and is preserved in the Kendal Museum. In 1874, one was recorded on the Lancashire coast (W. Turner. "Jnl. Anat. and Phys.", IV, p. 163).

THE GREY SEAL (*Halichoerus grypus*)

CASE 12

This species is distinguished from the common seal by its larger size and darker colour. In Britain it is now practically confined to the south, west and north coasts of Ireland, the Orkneys, Shetlands, and occasionally the coast of Scotland. To the south coast of England, the species is only a rare straggler. In length it may measure eight or nine feet. The specimen exhibited, an adult male, was caught about 15 or 20 miles off Annalong, Co. Down, Ireland, by one of Messrs. Harley & Millar's fishing boats. The Grey Seal, like all other species, has no under fur. In 1861 a Grey Seal was caught in the Canada Dock, Liverpool, and this specimen is still in the Museum. In June, 1908, another was got in the Mersey, near Warrington Bridge, 7 ft. 6 in. in length, and is now in the Warrington Museum. On October 28th, 1909, a young Grey Seal was stranded on a bank off Hoylake, and it was secured alive for the Liverpool Museum.

THE HOODED SEAL (*Cystophora cristata*)

CASE 12

This species is easily distinguished by the peculiar bag of skin on its muzzle, capable of being inflated with air when the animal is excited. The male has this nose bladder much more developed than the female. This seal is much more pugnacious than those hitherto described, and will give battle to an enemy, attempting to bite him with its canine tusks. It inhabits the colder regions of the North Atlantic, and is migratory in habits, occurring in South Greenland from April to June, straggling as far south as Iceland, North Scandinavia and sometimes to the coasts of Britain and France. The chief food of this seal is stated to be cod and flounder. It spends the greater part of its life on the ice, upon which its young are born in the spring. The first British specimen recorded was taken in the river Orwell in 1847, and is now in the Ipswich Museum. A second was killed at St. Andrews in 1872, and others are reported to have been taken on the Scottish coasts. The specimen in the case was captured alive on the Mersey shore at Frodsham Marsh on the 3rd February, 1873, and was exhibited at Widnes, where the Curator of this Museum at the time (the late Mr. J. T. Moore) saw it alive and made sketches from it. It was 6 ft. in length, and in very fine condition. A full description is given in the "Proceedings of the Liverpool Biological Society," Volume II.

THE DORMOUSE (*Muscardinus avellanarius*)**CASE 13**

Although this handsome species resembles the squirrel in many of its habits, it is more nearly related to the mice and rats. The Dormouse is not found in Scotland or Ireland, and in England it is chiefly confined to the central and southern districts, choosing for its habitat sheltered valleys with a good growth of hazels. These little rodents frequent shrubs and thickets rather than trees, although the latter are often visited in search of food, which includes haws, hazel nuts and acorns. During late spring, a nest is built of twigs, moss, grass and dead leaves, usually in a thicket, in which the young, four to six in number, are brought forth. Born blind and naked, they grow quickly, and in a short time are able to take care of themselves. If a second litter is produced in September, it is doubtful if they are able to build up sufficient strength to enable them to hibernate successfully. The Dormouse passes the winter in a profound state of torpor, coiled up like a ball with its thickly-haired tail curled round the body and passed round the head. The animal lies face downward in a circular nest, composed of thick herbage and leaves, concealed low down in a dry hollow stump, or among the roots of the hedgerows. At the beginning of the torpor, Dormice are loaded with fat accumulated in the autumn, which is gradually used up during the long winter sleep. That the awakening of a torpid Dormouse is a slow affair is shown by the fact that if an individual during hibernation be warmed too suddenly into wakefulness, it dies in a few minutes, after violent palpitation of the heart. The winter sleep usually begins in October and lasts until about the following March.

THE HARVEST MOUSE (*Micromys minutus soricinus*) **CASE 13**

This small graceful mouse, next to the pigmy shrew, is the smallest of the British mammals. It is comparatively abundant in Hampshire, Cambridgeshire, Devonshire, Gloucestershire, Warwickshire, and Wiltshire. In other counties, more especially in the north, it is by no means common. In Scotland it has been recorded from Aberdeenshire, Fifeshire, and near Edinburgh, but in Ireland it is unknown. It has been recorded in Lancashire at Halsall Moss, in 1864. In Cheshire there are four records. This species takes its name from its partiality for corn-fields, where it builds nests in the growing corn. The nest, composed of dry, coarse grass supported by three or four corn stalks, is cunningly woven into a ball. There is no entrance to these nests, the female entering anywhere, and the opening closing after she has passed inside. She leaves in the same way, at any place she wishes. The young, which vary from five to nine in number, are blind, naked and helpless when born, but

grow rapidly and soon reach maturity. They are so light in weight that they ascend and devour the corn without bending the stalk, being assisted by the tail, which has the power of grasping. During harvest time, they are carted to the stacks, and there remain until threshing scatters them.

THE WOOD MOUSE (*Apodemus sylvaticus*)**CASE 13**

This species, often called the Long-tailed Field Mouse, is easily distinguished from the house mouse by its larger size, prominent eyes, and white feet and underparts. The food of these animals includes corn, bulbs, nuts, acorns, and various small seeds as well as insects and grubs. They are often a serious pest to the gardener as they dig up peas and other seeds as fast as they are planted. The Wood Mouse does not hibernate but lays up a store for the winter, often accumulating large quantities of peas, beans, and corn in burrows underground. It comes forth in almost any weather, but dislikes rain. Wood Mice are exceedingly prolific, and produce several litters in a season. The ravages of this species on the crops of the farmer and gardener are largely due to the incessant war which is waged on owls, kestrels, stoats, and weasels, the natural checks upon the abundance of Wood Mice.

THE HOUSE MOUSE (*Mus musculus*)**CASE 13**

This well-known prolific species breeds many times in the year, bringing forth four to ten in each litter. In mild seasons, young are born even in December and January. The enormous geographical range of the House Mouse to-day must be attributed to the fact that wherever man has settled and constructed dwellings the House Mouse has followed.

THE RABBIT (*Oryctolagus cuniculus*)**CASE 13**

One of the most abundant and prolific mammals throughout the British Isles is the Rabbit. It thrives in cultivated fields, sand dunes, and plantations, and in the latter it is often very destructive, stripping the bark from young pine, ash, birch, oak and other trees. A considerable amount of damage is done to turnip crops if these rodents are not fenced out. When six months old, or even earlier, they commence to breed, producing from four to eight in a litter, while there may be as many as eight litters in a year. Rabbits are gregarious, living in a network of tunnels, called a "warren," excavated by themselves. When the female is about to give birth, she usually leaves the warren and digs a burrow or "stop" some distance away, lining this nursery warmly with fur plucked from her own body. The mother seldom lies with her offspring, but visits her family at intervals, closing the opening of her burrow with earth after each visit. During

recent years, the value of the rabbit's pelt has increased considerably. The poorer fur is used chiefly for felting for hats, the finer skins being tanned and the fur clipped, dyed, and made up to imitate the more expensive fur animals and also many unknown animals, such as coney seal, electric seal, beaver coney, and numerous others.

THE WATER VOLE (*Arvicola amphibius*)

CASE 14

This species, usually incorrectly styled the Water Rat, is the largest of the British voles. It is met with in large numbers throughout England and the greater part of Scotland, although apparently unknown in Argyllshire and the Isles, as it certainly is in Ireland. On the whole it is not harmful, feeding almost entirely on aquatic plants and roots. The real grievance against the Water Vole is its habit of boring through canal banks and dykes erected about mills. It is the least prolific of the voles, producing one litter of five or six young each year. This species is abundant in this area, and prone to melanism (see Case A). In the Museum Study Collections there are fifteen melanic specimens taken from a pond at Leasowe some years ago.

THE BANK VOLE (*Evotomys glareolus britannicus*)

CASE 14

The Bank Vole is about the same size as the field vole, but differs externally in the matter of colour, the upper parts being chestnut, the flanks grey, and the underparts nearly white. Another distinction is in the cheek-teeth, which develop roots in the adult, whereas those of the field vole do not, and it is on this account that the Bank Vole has been placed in a separate genus. It may be abundant, but, owing to its habits in living in ivy-grown coppices and hedgerows, and only coming abroad at dusk, it is easily overlooked. It is common locally, and easily trapped. Besides harm done in gardens, these voles often inflict serious injury to trees by gnawing the bark, such injuries taking place in winter and early spring. In general habits they are similar to the field vole.

THE FIELD VOLE (*Microtus agrestis hirtus*)

CASE 14

The voles differ from mice in being more clumsily built, and in possessing more rounded muzzles, smaller eyes, short ears almost enveloped in fur, and short hairy tails. The common Field Vole ranges all over England and Scotland, including the Hebrides, although it is unknown in Ireland. Voles are almost entirely vegetarian in their diet, and occasionally become a great scourge to farmers, appearing in enormous hordes, and eating up everything green. One of the most severe plagues on record in the British Isles occurred in the south of Scotland in 1892, when between 80,000 and 90,000 acres were rendered useless. If owls, kestrels and



CASE 15.

SQUIRRELS WITH DREY.

buzzards were not destroyed to the extent they are, these visitations would not occur. Breeding begins in April, and continues till late autumn, four to eight being produced in a litter. The breeding nest may be in a burrow, but often it is under a log, or beneath tufts of grass in runs which extend in all directions. In autumn these burrows are stored with food, consisting of corn, fallen haws and beech mast, which is for use between the intervals of torpor, in which most of the winter is passed.

THE ORKNEY VOLE (*Microtus orcadensis*)

CASE 14

This species is larger than the field vole, and possesses other slight structural differences in its teeth and skull. Otherwise it is similar to the field vole. The specimens and moss, etc., shown in the group, were collected and presented by G. R. Ellison, Esq., of Liscard, Cheshire.

THE COMMON SQUIRREL (*Sciurus vulgaris leucourus*)

CASE 15

[See PLATE VII.]

The Red Squirrel occurs throughout suitable wooded areas in the British Isles. It is plentiful in Cheshire, common in North Wales, but rarer in the Lake District. In Ireland it is now fairly abundant, but it has been introduced by man. Although nuts form its principal diet, fungi of various kinds, eggs and young birds are also eaten. Squirrels are fond of the inner bark of trees, especially during spring, when the sap flows freely, and at that season they may do much mischief to plantations. In autumn, nuts are collected and stored in holes in the ground and in trees for winter use. This food reserve is drawn upon at intervals, since squirrels do not hibernate throughout the winter, but become torpid for long or short periods during the cold wet weather. Both the male and the female build nests, or "dreys," in which to live. They are globular in form, with an entrance generally at the side, and are constructed of leaves, twigs, and moss. These shelters are often built in conspicuous situations in the forks of trees, but the nursery of the female, which is made in much the same manner, is carefully concealed among the branches of a thick conifer tree or in a hollow tree trunk. The young are born in May or June, and are from two to four in number. Squirrels differ considerably in general appearance at different seasons of the year, these changes being due in part to the bleaching effect of light on the fur, and in part to the shedding of the coat. The winter coat, which makes its appearance from the latter part of October to early November, is long and of a rich nut-brown colour, the flanks being tinged with grey, and on the tail the hair is of considerable length, forming a thick "brush." In May the winter dress begins to be shed, the ear tufts disappear, and a new coat is developed which is thinner, shorter, and redder in colour.

THE HARE (*Lepus europaeus occidentalis*)**CASE 16**

This species is distributed generally throughout England and Wales, and the Lowlands of Scotland, but in Ireland it is unknown. Its food consists chiefly of clover, grass, corn, turnips and the bark of young trees. It does not burrow like the rabbit, but when threatened with danger remains motionless (freezes), trusting for concealment to the resemblance of its colouring to its surroundings. If this is unsuccessful, it will then endeavour to escape by flight, and owing to its extraordinary length of leg, the hare can attain a considerable speed. During the day, hares repose amid ferns, grass and bushes, each hare resorting to one particular spot to rest, this spot being known as a "form." Their hearing is extremely acute, and they also have the advantage of having the eyes placed directly on the side of the head, thus giving the animal a very wide range of vision. Pairing is promiscuous, and in mild seasons commences in February. March, however, is the real season of courting. The males then become excited and quarrelsome, running to and fro, leaping over each other and endeavouring to kick one another as they pass, and even using their teeth to prove their superiority. These encounters occasionally end fatally. The young, two to four in number, have their eyes open when born, their bodies clothed with fur, and they are almost immediately capable of running. The advanced condition of the young hares, or "leverets," is connected with the fact that they are born in the open without the shelter of a burrow.

THE MOUNTAIN HARE (*Lepus timidus scoticus*)**CASE 16**

This species is native to the Highlands of Scotland, but its range is now extended by artificial introduction into England, Wales and Ireland. It is inferior in size to the common hare, the head is smaller, and the ears, tail and hind legs are relatively shorter. The fur is thicker and shorter than the covering of the brown hare. In winter the coat of this species becomes white, leaving only the tips of the ears black (see Case B for seasonal changes). The Alpine hare does not prepare a form like the common hare, but conceals itself during the day in crevices in rocks and among boulders. The breeding habits are similar to those of other hares. The Irish hare (*Lepus hibernicus*) differs from the other members of the group in its strong russet colour, and in the partial or complete absence of the white winter coat.

THE BLACK RAT (*Epimys rattus rattus*)**CASE 16**

This species, like the brown rat, is not an original inhabitant of the British Isles, but has been conveyed in ships from the Continent. It probably gained an entry into Great

Britain during the fifteenth century, from which time it has gradually spread over the whole country, destroying much property and food, and causing, by the parasites it leaves, terrible outbreaks of plague, which decimated the population of Europe during the Middle Ages. The arrival of the Brown Rat, early in the eighteenth century, introduced a formidable rival, which spread rapidly over Britain, killing the Black Rat whenever they came into actual contact. This has reduced considerably the range of the Black Rat, although it is still abundant in sea ports, being continually reinforced by immigrants from ships. The Black Rat differs from the Brown by its smaller size, thinner and larger ears, more pointed head, and longer tail. It is essentially an arboreal or climbing animal, and it rarely burrows. It is for this reason that, when infesting buildings, it is usually found in the walls, ceilings, or on roofs, and not in the cellars or drains. Although it is extremely nervous, it does not shun mankind, and for this reason it is often the species of rat concerned in the transmission of that dreaded disease, bubonic plague. The bite of a rat flea, which has fed on the blood of a plague-stricken rat, is sufficient to inoculate a human being with bubonic plague. This and the Alexandrine rat are the common rats found on ships.

THE ALEXANDRINE RAT**CASE 16**

(*Epimys rattus alexandrinus*)

The upper parts of this species are light brown, the underparts being strongly contrasting pale buff or light grey. The range and habits of this sub-species are similar to those of the black rat. The black and brown ship rats freely interbreed, but will not cross with the Norway rat (*Epimys norvegicus*).

THE BROWN RAT (*Epimys norvegicus*)**CASE 16**

This species was originally confined to the north temperate regions of the Old World, but with the advent of trading ships and commerce, it has now spread to all countries. From the time the brown rat gained a foothold in this country, during the eighteenth century, the black rat has steadily decreased in numbers, not being able to hold its own against this formidable rival. The Brown Rat, which is called the "Sewer Rat," is found in sewers, barns and warehouses, and being an excellent swimmer it is commonly met with in ditches and ponds. This species will consume anything eatable, and contrives to adapt itself to almost any circumstances. It is exceedingly cunning, and very difficult to trap. Like other rodents, rats have to gnaw hard substances to keep their ever-growing incisors at the proper

length. In default of wood for this purpose, much damage is done to leather, lead pipes and even brick work. Eight to ten young are produced at birth, and there are at least four litters a year. The tame or domestic rat, with white fur and pink eyes, is the albino form of this species. (For other colour variations see Case A.)

THE RED DEER (*Cervus elaphus scoticus*)

CASE 17

Centuries ago, this fine mammal roamed throughout the wooded areas that formed a large part of the British Isles. Owing to the advance of civilisation and deforestation, the Red Deer is now confined to the Scottish Highlands, the Hebrides, the Island of Mull, Devonshire and Somersetshire. In Ireland it survives in the wilder parts. The male is called a Stag and the female a Hind. It is distinguished from the fallow deer by its larger size, more pronouncedly reddish-brown coat, and straw-coloured rump patch. The antlers, worn by the males only, are shed periodically, usually in February and March, the new growth commencing in April and being fully developed by August. During growth, the antlers are covered with a velvet skin which serves to protect the underlying blood vessels. When the growth is completed, the velvet dries and peels, assisted by the animal rubbing its antlers against the stems of trees. During September, stags proceed in search of hinds, expressing their challenge to other stags by bellowing, which also attracts the hinds. At this season the combats among males are very fierce and often end fatally. The fawns are born in May or June, the hind rarely bringing forth more than one at birth. The young are spotted, and will remain perfectly still, concealed in rank herbage, when danger threatens. The food of the Red Deer consists of grass, leaves, acorns, leaf-shoots, beech nuts, and mushrooms. They are very fond of salt and will pay frequent visits to the sea to lick the salt from rocks.

THE ROE DEER (*Capreolus capreolus*)

[See PLATE I.]

CASE 18

This small forest deer formerly roamed throughout Great Britain, but is now chiefly confined to the wilder forest-clad districts of Scotland. In Ireland it is unknown. Feeding chiefly in the morning and evening, they repose during the day. Antlers are only possessed by the male, and are small, simple and rounded, and shed annually. In the first year they consist of a single spike, in the second year this bifurcates, and in the third year the upper branch again divides, so that there are three points. Divisions do not go beyond this stage, but the antlers of subsequent years grow thicker and stronger. The male, or buck, sheds his antlers

about the beginning of December, the new pair reaching full growth in February and being clear of the velvet by March. The antlers of this species show an unusual tendency to "sport." Roe deer are very agile and can leap a six-foot wall with ease. This species exhibits a striking seasonal difference in colour; in winter the coat is greyish-olive speckled with black, while in summer it is fox-red. The fawns, generally two in number, are marked with rows of whitish spots on a yellowish ground. The group consists of four specimens, male and female and fawn, with a male showing the antlers in velvet.

THE FALLOW DEER (*Dama dama*)

CASE 19

The Fallow Deer has been introduced from the Mediterranean countries, chiefly as a park deer. It is readily distinguished by the peculiar shape of the antlers, which spread into broad plates bearing well-marked points along the hinder border. The general colour in summer is yellowish-fawn above, with rows of white spots on the back and sides, while the underparts are white. During winter, the spots more or less completely disappear. There is an almost black variety, without spots, at any season. Their food, while similar to that of the red deer, is characterised by a special partiality for chestnuts. The antlers are shed in May, and the new ones begin to grow about ten days afterwards. The young bucks develop the first traces of antlers in the second year, and are known as "prickets." At each yearly renewal, the antlers increase in size and complexity, but after the sixth year there is no appreciable difference in their appearance. At the approach of senility, the antlers begin to reduce in size. This case contains an adult male, or buck, in summer coat, a young male in winter coat, a female of the almost black breed, and a fawn.

THE PORPOISE (*Phocaena phocaena*)

CASE 20

The Common Porpoise is the most abundant and best known of the British cetaceans. It is sociable in its habits, and may frequently be seen around our coasts, swimming with a series of undulating movements characteristic of these mammals. The food of the Porpoise consists chiefly of mackerel, herring and pilchards, although it also consumes salmon. The Porpoise only produces a single young at a birth. This species rarely exceeds five feet in length. The very young specimen in the case, 18 inches in length, was brought to the Museum on March 22nd, 1888, by Mr. John Hanmer, who caught it in a shrimp net after it had been submerged for two hours, but it only lived about ten minutes.

THE DOLPHIN (*Delphinus delphis*)**CASE 20**

The Common Dolphin differs in structure from the porpoise in its pronounced beak, the jaws being furnished with a series of fine teeth. This species is more commonly met with in the English Channel than the northern seas. A single offspring is produced at birth, and is attended by the female with assiduous care. The specimen in the case was found on the shore at New Brighton, Cheshire, on the 12th of February, 1879, minus the tail, which had been evidently cut off by the propeller of a steamship.

THE PILOT WHALE (*Globicephala melaena*)**No. 21**

This specimen was stranded, with forty others, in the River Humber on June 9th, 1862. The Pilot Whale has a world-wide distribution. It is a frequent visitor to the Faroe Islands, as well as to the Orkneys, and more rarely to the Hebrides. It is easily distinguished by its nearly uniform black colour, rounded head, low triangular back-fin, and the great length and narrowness of the flippers. The Pilot grows to about 20 feet in length. It is a sociable and inoffensive animal, feeding chiefly on cuttle-fishes and squids. When a "school" is attacked, all the members crowd together, and can thus be easily driven ashore by boats, so that in the Faroes hundreds are frequently captured at a time in this manner.

SKELETON OF THE PILOT WHALE**No. 21a****THE HUMP-BACKED WHALE** (*Megaptera nodosa*)**No. 22**

On June 17th, 1863, this whale was stranded on a sand-bank in the Mersey opposite Speke. It was examined in the flesh and described by Mr. T. J. Moore, the late Curator of this Museum, in his Report on the Seals and Whales of the District, in the "Proceedings of the Liverpool Biological Society," Vol. III. The dimensions taken at the time were: Total length, in a straight line from snout to cleft of tail, 31 ft. 4 in.; length of gape, about 8 ft.; from snout to eye, 8 ft.; length of eye, 3 ins.; from snout to the commencement of the pectoral fin, 10 ft.; extreme width of tail at the tips, 11 ft.; from the snout to the commencement of the dorsal fin or hump, 18 ft.; length of dorsal fin, 3 ft. 3 in.; from snout to cloaca, 21 ft. Quantities of shrimps were found in the stomach. The Genus *Megaptera* is distinguished from the Genus *Balena*, or whalebone whales, by the presence of a dorsal fin or hump. The belly is plaited or deeply grooved, and the plates of baleen (whalebone) are broad and short, in which characters this specimen agrees with the type. The

longest plate of the baleen measures about 2 ft. long by 5 in. at the base, and the plates are close together, counting 38 to the foot. The creature is quite black, except for the belly, which is mottled and streaked with white, and the pectoral fins which are milk-white, with several black blotches. The usual length attained by this species ranges between 45 and 50 feet, the female being superior in size to the male. Humpbacks are widely distributed over the Atlantic and Pacific Oceans, although they rarely visit the British seas. They are remarkable for their sportive habits, frequently throwing themselves out of the water.

SKELETON OF THE BOTTLE-NOSED DOLPHIN**No. 23***(Tursiops truncatus)*

Mr. T. J. Moore, in his reports of the capture of this Dolphin ("Proceedings of the Liverpool Biological Society," Vol. III), says:—

"Into the northernmost of the two bays formed by the railway embankment connecting Holyhead with Anglesey, a small shoal of cetaceans found their way, on April 14th, 1866, and proceeded so far that they got stranded near Valley, on the Anglesey shore. The workmen of Valley foundry waded into the water and succeeded in killing and capturing fifteen or sixteen of the animals. I arrived on the spot ten days after, just in time to make a few notes before the remains were dispersed. All the heads and most of the bodies had already been purchased for the Cambridge and London Museums, but I managed to secure for the Liverpool Museum one of the decapitated bodies and the head to match. The largest of the batch measured 11 feet 8 inches."

On the 20th August, 1918, a member of the staff of the Museum examined a male of this species cast ashore at Leasowe. It measured 12 ft. in length and 80 in. in girth, and the general colour of the upper parts was black, gradually shading into white beneath. The Bottle-nosed Dolphin is a rare visitor to the British coasts. Its distribution ranges from the Mediterranean to the North Sea.

THE WHITE-BEAKED DOLPHIN**No. 24***(Lagenorhynchus albirostris)*

The White-beaked Dolphin takes its name from its white lips. The mounted skin and the skeleton are from the same beast. Its capture is thus recorded in the "Proceedings of

the Liverpool Biological Society," Vol. III, by the late T. J. Moore, then Curator of this Museum:—

"On the 29th December, 1862, at daybreak, a fresh wind blowing from W.S.W., and the tide being about quarter ebb, a cetacean was discovered stranded at Little Hilbre, one of two closely contiguous islands at the mouth of the River Dee. It was observed by Mr. Barnett, Inspector of Buoys, who resided on the larger island, and who had noticed others off the shore a few days previously. I had urged Mr. Barnett, on the occurrence of such creatures, to endeavour to secure examples for the Liverpool Museums, and he was, in consequence, kind enough to immediately proceed to the mainland for a suitable conveyance, into which it was carefully removed and brought to Birkenhead Ferry and thence across the Mersey to the Museum. The creature was still living, spasmodically breathing at irregular intervals; the body was warm to the hand, and tear-like moisture oozed from its eyes as it lay quiescent in the cart. It died at the moment when a tank was ready to receive it. Its total length from snout to cleft of tail was nine feet."

This Dolphin is a rare species, inhabiting the North Atlantic, and was first recorded in Britain in 1848 by Brightwell. This specimen, described by Mr. Moore, was evidently the second recorded as British. The next recorded occurrence was at Cromer in 1866. Of its habits nothing definite is known.

CASE A

ALBINISM, MELANISM, AND OTHER VARIATIONS IN THE COLOUR OF MAMMALS.

Albinism, or unusual whiteness, occurs in animals which are normally coloured. It may be either complete or partial, and is due to lack of pigment or colouring matter. True albinos have pink eyes, the colour being the red of the blood circulating in the retinal blood vessels as seen through the transparent tissue in front. The badger, hare, rabbit and mole illustrate this phase.

Melanism, or unusual blackness, is due to an excess of pigment; a typical example is the water vole.

Other colour variations or sports are seen in the hare and water shrew, which develop what are known as silver varieties.



p.35.

ADDER, GRASS SNAKE, FROGS, TOADS AND NEWTS.

CASE C.

SEASONAL CHANGE IN COLOUR OF MAMMALS CASE B

In northern regions with well-defined seasons, many forms of animal life possess a colour variation which corresponds with that of their surroundings. The upper and lower groups represent the same scene during winter and summer, and it will be noted that the colour of the Alpine hare and stoat harmonise with the prevailing hues of each season.

REPTILES AND AMPHIBIANS

[See PLATE VIII.]

CASE C

A case representative of the British reptiles and amphibians will be found at the far end of the gallery, opposite the British fish.

Reptiles and amphibians are usually treated together for convenience, but the gulf dividing these two classes of vertebrates is really very wide. The amphibians differ fundamentally from the reptilia in passing through a more or less prolonged aquatic larvae or "tadpole" stage, during which breathing is carried on by gills. The young of the reptiles, on the other hand, are born on land

THE GRASS SNAKE (*Tropidonotus natrix*)

CASE C

This harmless species, often called the Ringed Snake, is more commonly met with in the southern and midland counties of Great Britain than in the north. It is unknown in Ireland. Its food consists chiefly of frogs and toads, which are swallowed whole and alive. To enable a snake to swallow food very much larger than its own head, the bones of the jaw are loosely articulated and capable of remarkable expansion. The average length of this species is about three feet, but specimens attaining the length of five feet are occasionally found. It is seldom found far from water. The grass snake passes the winter in a state of torpor.

THE VIPER (*Vipera berus*)

CASE C

This species, often called the Adder, is widely distributed throughout Lancashire and Cheshire, but is not common. It is the only venomous British reptile, and is easily distinguished by the black zig-zag diamond-shaped pattern down the centre of the back. The pupil of the eye is vertical or slit-like and not round as in the grass snake. The Adder kills its prey, mice, voles and toads, by poisoning before swallowing. The fangs of the viper are hollow and connected at the base with poison sacs situated in the temporal region of the head. The actual process of puncturing the skin injects a minute drop of poison into the wound. The favourite haunts of this species are dry, sunny banks and dry woods.

THE SAND LIZARD (*Lacerta agilis*)**CASE C**

In the British Isles this species is practically confined to suitable localities in Dorset, Hampshire, Surrey, and Lancashire. Its favourite haunts are hot, sunny banks, sandy heaths and commons, and it feeds on insects. It is oviparous, laying from five to eight eggs in the sand, or under leaves, and leaving them to hatch out by the heat of the sun.

THE NATTERJACK TOAD (*Bufo calamiti*)**CASE C**

In the British Isles this species is local in occurrence. Like the common toad, it is to be met with in Ireland. It is smaller and more handsome than the common toad, and is easily distinguished by the bright yellow line down the centre of the back. Although possessed of short legs, it can run fairly quickly. Sandy areas near water are its favourite haunts. It is very fond of burrowing.

THE COMMON TOAD (*Bufo bufo*)**CASE C**

The Common Toad is found throughout Great Britain, but is unknown in Ireland. Toads differ from frogs in their shorter legs, warty skins and toothless jaws. The females are larger and more handsome than the males. The warty skin of the toad is richly supplied with a whitish acrid poisonous secretion, which is used for defensive purposes only. The dog, fox, or stoat which picks up a toad would hesitate to repeat the experiment. The breeding habits of the toad are similar to those of the frog, except that the spawn is laid in long rope-like coils instead of masses.

THE FROG (*Rana temporaria*)**CASE C**

This well-known amphibian is widely and abundantly distributed throughout the British Isles. It is readily distinguished from the toads by its long hind legs and smooth skin. Insects, worms and slugs are its favourite food. The cold months are passed in a torpid state. During March, frogs assemble in their favourite ponds in large numbers, and at once spawning commences. The spawn is deposited in masses, from which, in three to four weeks, the tadpoles are freed. The hind legs develop first, the front legs not appearing through the skin until the animal, which by this time has lost its long tail, is nearly ready to leave the water.

THE CRESTED NEWT (*Triton cristatus*)**CASE C**

This species is found throughout England and the south of Scotland, but does not occur in Ireland. Its food is similar to that of other British newts, and consists of insects, worms and snails. During the breeding season, this species becomes aquatic, and the male assumes a long serrated crest down the centre of the back. The eggs are laid singly, or in strings of two or three, and the female endeavours to secure them to the leaves of aquatic plants. The young possess outward gills which are absorbed at the end of the larvæ stage. After the breeding season, the animal resorts to dry land, where it hides under stones and in crevices of rocks, etc.

DOMESTIC MAMMALS AND BIRDS

The cases D, E and F will be found on the north side of the British mammal groups. In them are specimens recognised as varieties of mammals and birds in domestication, which have been derived by artificial selection from ancestors in a wild state.

DOMESTICATED PIGEONS**CASE D**

The domesticated race of pigeons, of which there are more than 200 varieties, have all been derived by artificial selection from a common ancestor, the Rock Pigeon (*Columba livida*), which is still found wild in many parts of Great Britain. A selection of the more well-marked varieties is here on exhibition. Many of these specimens are prize birds, and are the most typical of the family they represent.

DOMESTIC DOGS**CASE E**

The origin of domestic dogs is still in doubt, but in recent years there has been a steady convergence of views towards the conclusion that they are descended from a single species, the wolf. In outward appearance the most wolf-like of all domestic breeds is the Eskimo dog of Arctic America, and it readily crosses with the wolf. How and when most of the breeds arose is unknown, and since their true affinities are by no means understood, no satisfactory classification can be made. They may be assigned generally to the following groups:—

Eskimo, Sheep Dog, Greyhound, Mastiff, Terrier, Hound, Spaniel, and Poodle.

DOMESTIC CANARIES

The common Canary (*Serinus canaris*) is a small passerine bird, belonging to the finch group. It is a native of the Canary Islands and Madeira, where it occurs abundantly in a wild state. It was first domesticated in Italy during the sixteenth century. Since then it has been the object of careful artificial selection, the result being the production of over twenty varieties of canaries at the present time. Of these, many of the outstanding types are here shown.

DEVELOPMENT OF THE CHICK

The sixteen wax models illustrate the growth of the chick from the first until the twenty-first day of incubation, when the chick has broken out of its shell.

TEETH OF THE HORSE AS A MEANS OF ASCERTAINING AGE

The series of models illustrates the succession and character of the front teeth of the horse, and the changes which they undergo from birth to old age, in consequence of the wear to which they are subjected.

CASE F

CASE F

CASE F

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